Report of the Regional Science Workshop on Headwaters and Associated Wetlands in the Mid-Atlantic Highlands Regions

June 20-21, 2006
Philadelphia, Pennsylvania

ORD REGION

RESEARCH AND DEVELOPMENT

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Executive Summary

Headwater streams and isolated wetlands are valuable resources. They function to support a wide range of ecosystem services in watersheds, such as nutrient control, flood conveyance and water purification. They also supply important habitat for fish and wildlife resources. The significance of headwater streams and isolated wetlands, however, often is not recognized and appreciated by the general population, planners and others responsible for land and water development..

A wide range of activities has been undertaken by the U.S Environmental Protection Agency (EPA) to better identify, protect and restore headwater streams and isolated wetlands. Amidst that work, research has been initiated to help build the scientific tools needed to support these activities.

The "Regional Science Workshop on Headwaters and Associated Wetlands in the Mid-Atlantic Highlands Regions" was conducted on June 20-21, 2006, at the EPA Region 3 office. The gathering brought together scientists from EPA's Office of Research and Development (ORD), technical staff from EPA Regions 3 and 4 and their partnering state agencies. The shared goal for the workshop was to describe the state-of-the-science on headwater streams and isolated wetlands. They also worked to explore opportunities to fill science gaps in a way that will support the educational, policy and regulatory activities needed to protect these resources.

The original intent of the workshop was to cover a broad range of activities that impact headwater streams and isolated wetlands, including urban development, forestry, agricultural practices and mining issues. The scope of the workshop was narrowed by the workshop planning team because of the regions' special interest on the highly visible topic of mountaintop mining/valley fill (MTM/VF). Planning for a parallel western workshop series has been initiated. The scope of those workshops will be broadened to cover the wide range of stressors and provide more coverage of the isolated wetlands issues. The workshop series is tentatively planned to begin in the fall of 2007.

The workshop attendance intentionally was limited to a relatively small number (approximately 70) of people to maximize the opportunity for interaction and small group discussion. The agenda supported the ORD research planning process and associated efforts to identify science needs. The workshop was designed to maximize opportunity for sharing ideas and approaches and to address these needs. ORD used the workshop as a vehicle to explore the direction of a recently developed research framework for headwater streams and isolated wetlands. It is anticipated that subsequent research planning will be based on the workshop discussion of the framework.

Workshop Report

Tuesday, June 20, 2006: Overview of Ecosystems as Risk

Introduction

On June 19, 2006, the day before the workshop began, the Supreme Court issued a ruling on two federal Clean Water Act (CWA) cases (*Rapanos v. United States* and *Carabell v. U.S. Army Corps of Engineers*, collectively referred to as "Rapanos") centered on defining "waters of the United States". The decision voided previous lower court rulings against Keith Carabell and John Rapanos. Carabell had proposed filling in wetlands on family property near a lake in Michigan to enable the development of condominiums about 1 mile from the lake. Rapanos planned to build a shopping mall on his property, which is approximately 20 miles from the lake. Rapanos previously had been found guilty of filling and draining 54 acres of wetlands at three sites, without appropriate state or federal permit, whereas Carabell's permit to clear and drain approximately 16 acres of forested wetland had been denied.

The Supreme Court ruled that regulators had exceeded the limits of the federal CWA, when they denied the two Michigan property owners the right to fill, drain, and build on the wetlands. The 4-1-4 plurality decision was based on the debate regarding the degree to which federal and state governments can extend jurisdiction over wetlands, especially if they are miles away from a waterway. Four justices led by Scalia rejected all or some of the government's arguments, whereas four Justices led by Stevens would have accepted those arguments. Essentially, the Scalia group argued (based on a 1954 dictionary definition) that rivers, lakes, oceans, and streams and the tributaries to such bodies of water only are covered by the law if there is a continuous surface connection and/or flow of water to connect to a navigable waterway (National Public Radio, 2006; Murphy, 2006). Justice Kennedy cast the deciding vote, stating that the CWA was promulgated to restore and maintain the integrity of the nation's waters, which could not be achieved under Justice Scalia's terms.

Although Kennedy sided with the Scalia group and ordered a remand to the lower courts for further adjudication, he agreed with the Stevens group for the most part concerning the role that many nontraditional waters (i.e., not navigable in the classic sense) have "to restore and maintain the chemical, physical, and biological integrity of the Nations waters. Such a demonstration of a significant nexus would be sufficient, in his opinion, to exert a federal interest and jurisdictional reach (Thomas, 2006). In retrospect, the operative term from the controlling Kennedy perspective is significant nexus on a demonstrated case-by-case basis or by the demonstration of such a relationship within a class of waters (Note: cumulative relationships conceivably can apply) (Murphy, 2006).

The controversial Supreme Court decision was disappointing for a large number of the workshop attendees from a number of perspectives. The opening talks of the workshop already had planned to discuss the pending court decision, but the announcement the previous morning led to a greater emphasis on the need to further develop the science on significant nexus and flow permanence/ connection criteria between headwater streams/isolated wetlands and navigable waters, as needed to protect and maintain the chemical, physical, and biological integrity of waters of the United States. The discussions highlighted the need for the U.S. Army Corps of Engineers to be more specific in presenting the value of these resources to a functioning ecosystem and better define the hydrologic connectivity and significance of these wetlands in the function of navigable waters. The challenge to the group was to use the workshop to identify the science needed to address these issues.

Overview Presentations

A presentation on hydrologic issues by Mr. Hugh Bevans, a U.S. Geological Survey (USGS) scientist, opened the workshop with a definition of ephemeral versus intermittent versus perennial streams. Ephemeral streams are supplied solely by rain, intermittent streams have at least a temporary groundwater connection, and perennial streams possess a permanent connection with subsurface water. Evidence was presented to support the contention that intermittent and ephemeral headwater streams largely are responsible for maintaining water quality and quantity in larger systems, especially with regard to sediment and nutrient control.

The next presentation by Dr. Scott Liebowitz of EPA focused on landscape connectivity of isolated wetlands. The presentation highlighted several relevant regulations, such as the CWA, the Migratory Bird Rule, and the Supreme Court Solid Waste Agency of Northern Cook County (SWANCC) ruling, which discusses the significance of a "connection" and a "significant nexus" to navigable waters in the interpretation of relevant authorities in protecting these resources. Isolated wetlands were defined, and the need to consider "isolation" not as a discrete, generic property but rather as a spatial and temporal continuum was emphasized. Connectivity (hydrological and biological) and the dependence of community function on the landscape were presented as key factors in understanding these wetlands.

Courtesy of Scott Leibowitz

Mr. David Rider of EPA addressed MTM/VF, the focus of the workshop. The Surface Mining and Control and Reclamation Act (SMCRA) was intended to balance the energy needs of the nation with the goals of protecting our national resources. SMCRA supports surface coal mining and mountaintop mining, which is defined as mining coal from the surface of mountaintops, ridges, and other steep slopes (by definition, those of 20 degrees or more) and involving a range of mining methods (e.g., contour, area, and auger). Typically the methods involve placing excess rock and soil or "overburden" in the valleys adjacent to the mine and result in well-documented losses of headwater streams and associated habitat.

Courtesy of David Rider

The MTM/VF in Appalachia Final Programmatic Environmental Impact Statement (EIS) (U.S. Environmental Protection Agency, 2005) demonstrated that greater than 1,200 miles of headwater streams had been impacted directly by MTM/VF in the Appalachian study area. In addition to the direct habitat destruction in the valley fill areas, significant elevations in selenium, total suspended solids, and connectivity were observed downstream, also posing a threat to aquatic biota. Key concerns that arose from the EIS include:

- ✧ The need to determine the ecosystem value of the lost headwater streams.

- ✧ The development of protocols for compensatory mitigation, the impacts of forest fragmentation, and social and environmental heritage loss.

- ✧ The cumulative impacts of MTM/VF mining practices.

Panel Presentations

Regulatory and Non-Regulatory Challenges and Approaches for the Protection and Restoration of Headwater Streams and Isolated Wetlands

Three federal agencies (the U.S. Army Corps of Engineers, the Office of Surface Mining, and the U.S. Fish and Wildlife Service) and three state agencies (the Kentucky Department of Environmental Protection, the North Carolina Department of Environment and Natural Resources, and the West Virginia Department of Environmental Protection) identified key technical needs, including:

- ✧ Methods to assess the function of headwater streams and isolated wetlands.

- ✧ Methods to assess the success of headwater stream compensatory mitigation projects (qualitative and quantitative). For example, do hollow fill surface and side groin drainage ditches reestablish functioning systems onsite and downstream of MTM/VF activities?

- ✧ Assess the full extent of impacts of valley fills downstream.

- ✧ Long-term mitigation monitoring, because the typical 5-year assessments only capture physical habitat and structural restoration components without a complete evaluation to determine if functional recovery has occurred.

- ✧ Assess impacts on riparian buffer zones and broader wildlife habitat and usage.

- ✧ Thresholds (acute and chronic) for total dissolved solids/specific conductance and tools to predict when impacts will lead to threshold exceedances.

- ✧ Assessment of impacts across the landscape and watershed. Which has less impact, numerous small valley fills or fewer large fills? Baseline pre- and postconstruction data are needed.

- ✧ Classification and rating of impacts to determine which ones would have the greatest environmental and socioeconomic impact to assist environmental managers in balancing the need for coal versus loss of valuable resources.

- ✧ Improved maps to identify the extent and permanence of headwater streams and isolated wetlands.

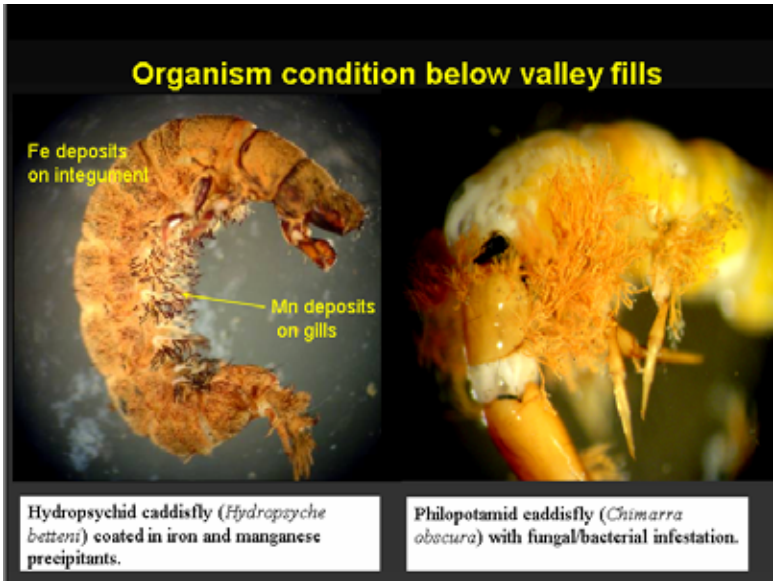
- ✧ Validate assumptions regarding watershed sizes supporting ephemeral, intermittent, and perennial streams.

- ✧ Surrogate indicators of headwater stream and isolated wetland functions being lost to enable monitoring for restoration of function.

Headwaters and Isolated Wetlands at Risk: A Science Perspective

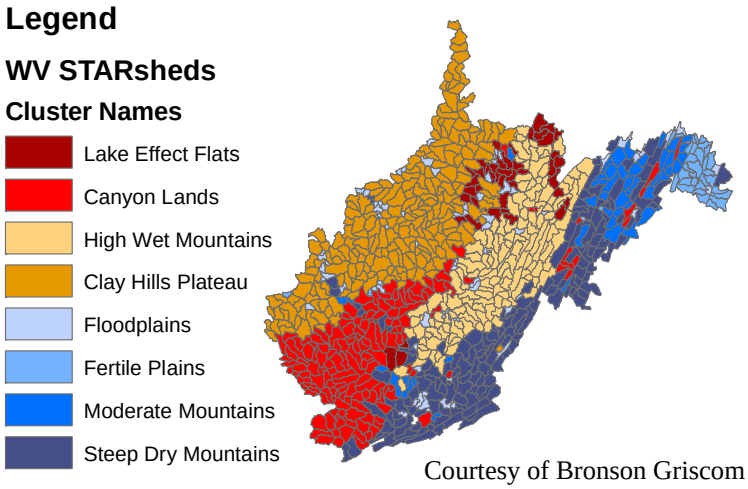
Presentations were provided on some of the specific science issues associated with headwater streams and valley fill mining practices in the Mid-Atlantic Highlands. Mr. Gregory Pond of EPA presented an extensive set of photographs to demonstrate how stream hydrology often is restored without the return of a functioning riparian buffer. Cases were presented where companies were willing to accept water quality penalties rather than remediate a stressor such as excessive sedimentation. Biotic assessment methods used to document and score the impairment caused by valley fills included: West Virginia's Stream Quality Index, Kentucky's Macroinvertebrate Bioassessment Index, and the River Invertebrate Prediction and Classification-Type O/E (observed:expected ratio) Predictive Model. The following conclusions were presented:

- ✧ Surface mining with headwater fills routinely causes impairment to downstream aquatic life.
- ✧ Although radically altered invertebrate taxonomic composition is important, more work needs to be done on evaluating functional losses.
- ✧ Elevated conductivity is the strongest correlate to biometrics, especially in mayflies.
- ✧ The wholesale loss of mayflies from headwater streams is a major concern and determination of the mechanism should be a priority.



Courtesy of Gregory Pond

Cumulative impact assessment was the topic of the next presentation by Dr. Denis Newbold of the Stroud Environmental Resource Center, with a focus on the impact of first and second order stream loss on production, downstream transport, and utilization of biodegradable dissolved organic carbon. A key factor is the distance dissolved carbon travels from first entry into a system to where it is actually metabolized, based on the rate of input and uptake/utilization at different points in the system. A modeling effort from the Twenty-Mile Creek Watershed in West Virginia was used to illustrate that carbon formed in first and second order streams may play a role in carbon utilization in the larger stream segments.



Courtesy of Bronson Griscom

The next presentation by Dr. Bronson Griscom of the Canaan Valley Institute focused on the importance of assessing the vulnerability of headwaters in Mid-Atlantic Highland watersheds during the mine permitting process. Vulnerability can be determined based on ecological resistance, the likelihood of human impacts, and the occurrence of rare species.

Factors that might impact the success of stream restoration were described by Dr. Art Parola of the University of Louisville based on experiences in Eastern Kentucky. Examples were provided that demonstrate how the final construction geometry of hollow fills can change substantially from the initial permitted design. Factors that must be considered in stream restoration include:

- ✧ Fill often is composed of porous material impacting groundwater and surface water interaction.
- ✧ Nearby hillslope processes, such as landslides, can contribute to slope failure, debris in channels, and displacement from the original planned locations.
- ✧ Variations in fill settlement can result in unpredictable modifications in channel slope in locations other than along fill sides.
- ✧ Downstream channel instability may propagate into fill channels or restored pond reaches, impacting the success of restoration.

The final presentation of this session by Dr. J. Todd Petty of West Virginia University discussed headwater stream restoration in mined watersheds of the Mid-Atlantic Highlands in West Virginia. Entire watersheds already have been lost as a result of acid mine drainage, and now additional environmental insult is occurring through MTM/VF practices. A watershed-scale approach needs to be taken that integrates restoration decisions and new mining effort permitting decisions. The following key questions were proposed:

- ✧ Are there watershed-scale consequences that emerge from extensive mining-related impacts (i.e., “neighborhood” effects), including downstream eutrophication as a result of reduced nutrient uptake capacity in mine-impacted headwater streams?
- ✧ Is there a decrease in fish diversity as a result of dependence on watershed-scale connectivity of stream reaches?
- ✧ To what extent can restoration be used to recover reach and watershed-scale conditions?
- ✧ What modeling, assessment, and administrative frameworks are needed to manage for watershed-scale conditions (i.e., a “neighborhood planning” approach)?

EPA Management Perspectives

EPA Region 3's Director of the Environmental Assessment and Innovation Division, Randy Pomponio, and the Director of the Water Management Division, Jon Capacasa, discussed Region 3's involvement with the MTM/VF issue and the development of the environmental impact statement. They restated the challenge discussed in the opening session of workshop, urging participants to help develop the response to the technical issues raised in the recent Supreme Court decision. The need to identify the location of these resources, the key functions they perform, and their contributions to the overall health of watersheds was emphasized.

The status of headwater streams and isolated wetlands was compared to that of tidal wetlands 30 years ago, when the value of these resources was unrecognized by many decisionmakers and the public, and a story had to be crafted to support the range of efforts undertaken to preserve and restore these resources, especially with the current demands for energy needs and other national priorities. The speakers emphasized the need for a variety of resources (e.g., funding for the development of better assessment tools, databases to track locations and loss of headwaters and isolated wetlands, and personnel to address the issues associated with protecting these resources). Antidegradation rules were identified as a regulatory tool that should be considered in the decisionmaking process.

Wednesday, June 21, 2006: Meeting Policy and Program Needs with Science

Panel Presentations

A Review of the State-of-the-Science

Dr. Mark Rains of the University of South Florida described an American Water Resources Association (AWRA) Special Session on Headwater Streams conducted at the 41st Annual AWRA Conference, which was held November 2005 in Seattle, Washington. A workgroup was tasked with addressing the following "Guiding Questions":

- ✧ To what degree are headwater streams and downstream waters hydrologically connected?
- ✧ What roles do headwater streams play in maintaining the physical, chemical, and biological integrity of downstream waters and the larger stream networks?
- ✧ Over what spatial and temporal scales are processes relevant?
- ✧ What are some of the possible consequences of eliminating or otherwise impacting headwater stream resources?

The responses of the workgroup will be published in a special collection in the *Journal of the American Water Resources Association*, expected to be released in February 2007.

Mr. Leibowitz's presentation focused on the "Special Edition on Isolated Wetlands" published by the Society of Wetlands Scientists (*Wetlands* Volume 3, Issue 3, published September 2003). The issue was one component of the post-SWANCC Supreme Court debate and associated regulatory uncertainties that highlighted the need for a review of the state-of-the-science and our scientific understanding of the function of isolated wetlands and their importance in watershed and ecosystem processes. The special edition covered legal issues, functions of isolated wetlands, hydrologic considerations, and descriptions of the varied isolated wetlands in the United States.

These presentations were followed by an open discussion on "Identification of Priority Science Issues Associated with Headwater Streams in the Highlands Region." Table 1 summarizes the discussion.

Table 1. Research, Technical, and Science Policy Needs

1. Engage diverse stakeholders of multiple disciplines in telling stories.
2. Determine if meaningful compensation is achieved from headwater stream restoration projects.
3. Determine the extent of aquatic values for ephemeral and intermittent streams.
4. Devise methods to link losses of headwater streams and isolated wetlands to declines in amphibians, invertebrates, and other biota.
5. Determine the cumulative hydrologic impacts to headwater streams in response to human activities.
6. Estimate the total water storage capacity for headwater streams.
7. Determine the amount of headwater stream loss that can be tolerated before water quality impairment to a watershed is irreversible.
8. Develop improved models to predict downstream peak flow that results in significant degradation to water quality and broader ecosystem impacts.
9. Determine the definition of specific mechanisms that result in significant biological impairment downstream from MTM/VF projects.
10. Quantify the amounts of atmospheric deposition to headwaters and isolated wetlands and the potential impact on downstream water quality.
11. Improve understanding of land use practices and their impacts on headwater streams and isolated wetlands in terms of impairment and reduced aquatic/ecosystem functions.
12. Obtain guidance on best management practices to reduce impacts and functional losses as a result of till practices associated with MTM/VF activities.
13. Assess the economic values of highly functioning headwater streams and isolated wetlands with a functioning ecosystem.
14. Develop "compelling stories" of "defensible" values associated with headwater streams and isolated wetlands.
15. Compose a clear, scientifically defensible response to the technical issues raised in the Supreme Court Rapanos Decision of June 19, 2006.
16. Facilitate improved data sharing among federal, state, and other partners to support improved tools (e.g., GIS) required to assess and protect the resources impacted by MTM/VF practices.
17. Develop novel practical tools to rapidly translate headwater stream and isolated wetland impacts to ecosystem functions and services.
18. Determine the linkages between headwater streams and isolated wetlands in low-relief environments.
19. Identify the physical and chemical mechanisms that result in high aquatic selenium values and document the ecosystem impacts of these elevated levels.
20. Determine points of inflection (threshold values) between stressors and specific points of impact.
21. Understand the impacts of total dissolved solids and mitigation practices that could minimize the adverse impacts.

ORD Research on Headwater Streams and Isolated Wetlands: A Framework and Overview

This session provided an opportunity for scientists from EPA's ORD to provide overviews of ongoing research projects and how these projects fit into the ORD Research Framework that guides the Agency research program on headwater streams and isolated wetlands (Figure 1).

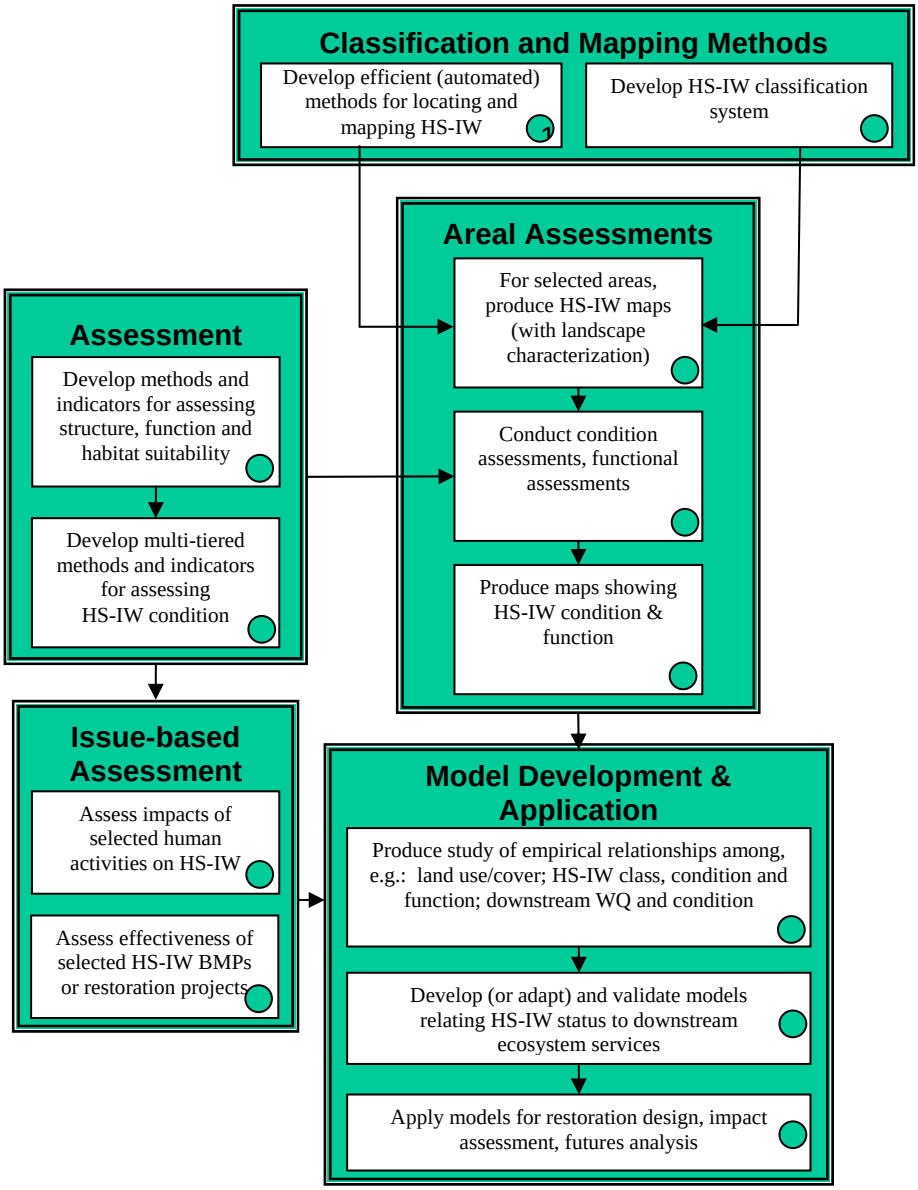


Figure 1. ORD Framework for Headwater Streams/Isolated Wetlands Research Tasks: A Process for Developing Science Tools That Will Answer Policy Questions

Breakout Sessions

The Breakout Sessions after the ORD presentations originally were scheduled to focus on the ORD Framework. Based on the Supreme Court ruling that set the stage for the workshop and its discussion

points, however, the organizers of the workshop proposed to the participants that the time be utilized to form two workgroups, one of which would craft a message in response to the science issues brought forth in the Rapanos Supreme Court case, and the other would craft a message to the much broader public audience. The workshop participants agreed.

The workgroups spent approximately 90 minutes discussing an approach for crafting these messages. Because the workgroups could not complete these statements in the time allotted, the goal was to sketch out the issues and develop a plan for moving forward. The results of the breakout sessions are described below.

Breakout Session I: Response to Scientific Issues Raised in Supreme Court Decision

Kennedy "Issues." For the most part Kennedy agreed with the arguments put forward by the Stevens group of four Justices but considered his "significant nexus" language to demonstrate a limited ecological perspective:

1. Two-dimensional thinking (e.g., decision does not appreciate subsurface connections, flow, etc.).

2. "In-the-now" timeframe (i.e., decision does not appreciate time lags).

3. Lack of full appreciation for regional differences (although decision did cite the Los Angeles Aqueduct and the Gulf of Mexico "Dead Zone").

4. Determination of "Significant Nexus." Decision requires regulators to identify some (as yet unknown) criteria to identify those…"categories of tributaries…likely in ***the majority of cases***…to perform important functions for an aquatic system incorporating navigable waters..."

Immediate Mission of EPA Professional Staff

1. Establish a dialogue with regional counsel and share perspectives.

2. Shepherd collective, logically consistent message/interpretation to EPA headquarters and other regions.

3. Scientists, in reaction to lawyers' interpretation, should develop an outline of "The Story."

4. Reach out to other relevant entities (e.g., USGS, states, etc.).

"The Story"

1. Case studies will reflect regional differences (e.g., arid southwest).

2. In any particular region all systems perform functions, but the rates of performance vary widely. Perhaps the key functions of major systems should be provided.

3. The story needs to be told with an appreciation for both space and time. Kennedy already appreciates the relationship of impacts to "waters" to the Gulf Dead Zone. Starting with the Gulf, Chesapeake Bay, or Delaware Inland Bays, tell the story in space and time about how decisions made throughout the watershed (at various scales and different time frames and lags) ultimately result in major *interstate commerce* ramifications.

4. The story must be informative with regard to the pulsed aspect of watershed ecology and the ramifications of segmenting the watershed, thereby ignoring space and time linkages.

5. The story could include the economic ramifications of eliminating relevant waters from CWA jurisdiction:

    a. For example, sediment released from the unregulated development of certain waters potentially can result in addition navigational dredging costs to the U.S. Army Corps of Engineers (e.g., Miller and Nudds, 1996).

    b. Flooding impacts of improper development of the upper watershed and the uneconomical subsidies of disaster relief and the National Flood Insurance Program. For example, why are "100-year floods" occurring on much more frequent intervals? The 2003 flooding of the Upper Mississippi Valley is a classic example.

6. The story should explain the interdependency of wetlands, streams, *and* adjacent terrestrial habitat.

    a. Herptiles (reptiles, amphibians).

    b. Interdependency of many species on different ecosystems for different aspects of their life cycle (waterfowl, American eel, anadromous fish, other game fish, commercially important species, and threatened and endangered species). Discuss Leibigs' Law of the Minimum (Odum, 1971) and explain its relevance to the regulation of headwater streams and isolated wetlands.

    c. Classic large-scale case studies:

        (1) The *whole* continental waterfowl story:

            (a) Winter in Central America, southern United States.

            (b) Migratory stepping stones required for northern migration.

            (c) "Short-stopping" at suitable breeding habitat along the way northward. Waterfowl pairs "test" site suitability as they move northward.

            (d) Inter- and intraspecific competition results in the dispersal of breeding pairs into seasonal and ephemeral wetland complexes.

            (e) Explain the significant fact that much waterfowl nesting and breeding occurs in adjacent uplands and not directly in the wetlands—wide dispersal aids in predator avoidance.

            (f) As ponds and shallow wetlands dry up, growing duckling broods migrate to (and converge on) larger wetlands.

            (g) Molting flightless stage performed in deep wetlands/ponds for loafing and escape cover prior to migration.

            (h) All waterfowl (especially the young-of-the-year) maximize feeding on invertebrates and other protein-rich food sources to build up reserves for the flight south.

(i) The southern flyway migration requires a series of stopover wetlands for rest. To avoid epidemics of avian cholera and other diseases, the wetlands have to be dispersed widely.

(j) And then the cycle begins again….

(2) Dependency of Mississippi Valley fisheries on pulsed flooding in the upper bottomland hardwood (BLH) zones.

(a) In years when inner (upper) BLH zones are flooded, spawning fish utilize the extended habitat and food resources accumulated over a number of years to produce the "bumper crops" that offset the lean years during drought when fishery stocks are more depleted.

(b) Major episodic transfer of energy from the terrestrial/riparian ecosystem to support the Gulf of Mexico ecosystem (especially fisheries).

The Immediate Region III Mission

1. Evidently the approaches of the regional report for the advanced notice of proposed rulemaking were not persuasive (nor were the *amicus* briefs).

2. Given that set of circumstances, regional staff should focus on whole-watershed (i.e., "top to bottom") arguments based on hard data.

3. Candidate watersheds with hard data in Region 3 include:

    a. Nanticoke River, Delaware and Maryland.
    b. Upper Juniata, Pennsylvania.
    c. Delaware Inland Bays.
    d. MTM/VF watersheds linked to the Ohio, Potomac, James, or Roanoke River drainages.

<u>Breakout Session II: Crafting a Broader Message on the Value of Headwater Streams and Isolated Wetlands for the Public, Land Use Decisionmakers, Developers, Planners, and Others</u>

✧ Business as usual is not working.

✧ We need an innovative way to approach MTM/VF mining to address associated impacts and protect downstream uses.

✧ Impacts (direct/indirect) to headwater streams should be regulated because these systems are important.

- Describe values of headwater streams.
- Local.
- Downstream.

✧ MTM/VF mining has impacts.

- Describe impacts.
  - Local.
  - Downstream.

- Regulatory Environment (legal issues).
  - Identify problems with the current regulatory process and implementation.
  - Impacts.
  - Time.
  - Funding.

✧ Decisionmaking tools within a watershed to minimize impacts.

✧ Avoid-Minimize-Compensate within a watershed: HOW THIS CAN BE A WIN-WIN.

Information Sources

Impact/Values
- Special collection (AWRA).
- EIS.
- 303(d) listings.
- Mining data: baseline, age, design, geology as built.
- Go through storyline and come back to initial statement.
- Regional Environmental Monitoring and Assessment Program.

Audience and Message

WHO IS THE AUDIENCE?
WHAT IS THE MESSAGE?

WHO
General Public
Regulators
Policymakers
Politicians
Mine Companies
DS Landowners
Watershed Groups

WHAT
- Why business as usual is not good enough (MTM/VF sustainability).
- Ephemeral and intermittent streams are too valuable to lose.
- Specific types/amounts of problems of government decisionmakers to be addressed.
- How do you live with MTM/VF activity?
- Identify a compromise—what to save/sacrifice.

References

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Beneficial Outcomes of the Workshop

Two collaborative research activities are in progress as a result of the breakout sessions of the workshop. One of the sessions focused on developing a science-based response to the recent U.S. Supreme Court ruling on the Rapanos and Carabell cases. EPA ORD scientists now are preparing a technical manuscript on this topic, in cooperation with EPA's Office of Water Wetlands Division and other academic partners. It is tentatively titled, "*The Effects of Headwater Streams and Adjacent Wetlands on Navigable Waters: Information Needs Following the U.S. Supreme Court's Rapanos and Carabell Decisions.*" The authors will evaluate the feasibility of using ecologically based classification systems to categorize headwater streams and adjacent wetlands so as to distinguish between those that meet jurisdictional legal tests and those that do not.

Discussion in the second session focused on how science can be better used to reconcile the environmental issues associated with MTM/VF mining in Appalachia. Session participants agreed that a "science story" needs to be crafted that will help Agency staff and the mining industry envision a path toward adoption of environmentally sustainable mining practices. EPA ORD and regional staff currently are working on a draft project prospectus that captures many of the innovative ideas expressed by the workshop participants. The draft document is entitled, "*An Alternative Futures Approach to the Assessment and Management of Valley Fill Mining.*" The described goal of the alternative futures approach is to build a public-private partnership that expands environmental decisionmaking from the site/project scale to the broader watershed scale. The jump in scale allows government and industry to view a broader range of conventional and conservation-based management actions for the coal mining regions. Those alternatives can be evaluated based on an analysis of the comparative vulnerability of watersheds to impacts and their respective opportunities for natural resource preservation, restoration, and recovery.

Appendices

Regional Science Workshop on Headwaters and Associated Wetlands in the Mid-Atlantic Highlands Region

EPA Region 3
4th Floor Conference Center, Shenandoah Room
1650 Arch Street
Philadelphia, PA 19103

June 20-21, 2006

Agenda

June 20, 2006	**Overview of Ecosystems as Risk**
8:30 a.m. − 9:00 a.m.	**Welcome** — *Jon Capacasa, Director, Water Management Division, EPA Region 3* *Randy Pomponio, Director, Environmental Assessment and Innovation Division, EPA Region 3* **Logistics** — *Ron Landy, Regional Scientist, EPA Region 3* **Facilitator** — *Rich Pepino, EPA Region 3*
9:00 a.m. − 9:30 a.m.	**Hydrogeologic Issues in Mountaintop Mining Regions** *Hugh Bevans, Director, U.S. Geological Survey, West Virginia Water Science Center*
9:30 a.m. − 10:00 a.m.	**Landscape Connectivity of Geographically Isolated Wetlands** *Scott Leibowitz, Western Ecology Division-Corvallis, Office of Research and Development, EPA*
10:00 a.m. − 10:20 a.m.	**Mountaintop Mining/Valley Fills in Appalachia—An Overview of EPA Concerns** *Dave Rider, EPA Region 3*
10:20 a.m. − 10:40 a.m.	**Break**
10:40 a.m. − 12:00 noon	**PANEL — Regulatory and Non-Regulatory Challenges and Approaches for the Protection and Restoration of Headwater Streams and Isolated Wetlands** ***Panel Chair — John Forren, EPA Region 3*** *(5-minute overviews followed by discussion)* *Representative — Jennifer Walker, U.S. Army Corps of Engineers* *Representative — Jenni Garland, Kentucky Department of Environmental Protection* *Representative — John Dorney, North Carolina Department of Environment and Natural Resources* *Representative — Russ Hunter, West Virginia Department of Environmental Protection* *Representative — Dave Hartos, Office of Surface Mining, U.S. Department of the Interior* *Representative — Christy Johnson-Hughes, U.S. Fish and Wildlife Service*

12:00 noon − 1:30 p.m. **Lunch** *(on your own)*

1:30 p.m. − 3:30 p.m. **PANEL — Headwaters and Isolated Wetlands at Risk: A Science Perspective**
Panel Chair — Stephanie Fulton, Water Management Division, EPA Region 4
(15-minute presentations and 30 minutes of panel discussion)

Site Impact Assessment of Mountaintop Mining/Valley Fill and Impacts on Biological Communities in Highlands Region
Greg Pond, EPA Region 3

Cumulative Impacts Assessment
Denis Newbold, Stroud Environmental Resource Center

A Classification of Mid-Atlantic Highland Watersheds To Identify High Vulnerability Headwater Systems and Valuable Isolated Wetlands
Bronson Griscom, Canaan Valley Institute

Mitigation and Restoration Practices for Kentucky Headwaters
Art Parola, University of Louisville

Headwaters Restoration in Mining Areas of West Virginia
J. Todd Petty, West Virginia University

3:30 p.m. − 3:45 p.m. **Break**

3:45 p.m. − 4:30 p.m. **PANEL — EPA Management Perspectives**
Panel Chair — Rich Sumner, Western Ecology Division, Office of Research and Development, EPA
Dave Evans, Director, Wetlands Division, Office of Water, Headquarters, EPA
Jon Capacasa, Director, Water Management Division, EPA Region 3
Randy Pomponio, Director, Environmental Assessment and Innovation Division, EPA Region 3

4:30 p.m. − 5:15 p.m. **Facilitated Discussion — Identification of Science Needs on Mountaintop Mining, as Related to Headwaters and Isolated Wetlands**

5:15 p.m. **Adjourn**

5:30 p.m. − 7:00 p.m. **Poster Session and Social**
(Sheraton Hotel, 17th and Race Streets, 215-448-2000, two blocks from the Region 3 Office)

The Monitoring, Assessment, and Evaluation of Headwaters and Isolated Wetlands
(Posters on completed, ongoing, or planned research efforts associated with these topics.)

June 21, 2006 **Meeting Policy and Program Needs With Science**

9:00 a.m. − 10:30 a.m. **PANEL — A Review of the State-of-the-Science**
Panel Chair — George Constantz, Canaan Valley Institute

American Water Resources Association Special Session on Headwater Streams and Synthesis Document
Mark Rains, University of South Florida, Department of Geology

Journal of the Society of Wetlands Scientists, Special Edition on Isolated Wetlands
Scott Leibowitz, Office of Research and Development-Corvallis, EPA

Discussion Session: Identification of Priority Science Issues Associated With Headwater Streams in the Highlands Region
George Constantz, Canaan Valley Institute

10:30 a.m. − 10:45 a.m. **Break**

10:45 a.m. − 12:00 noon **PANEL — ORD Research Group Panel**
Panel Chair — Jim Wigington

"ORD Research and Headwater Streams and Isolated Wetlands"

Framework and Overview of Ongoing ORD Research — Randy Bruins

Questions and Discussion — Panel Members
Randy Bruins, Ken Fritz, Brent Johnson, and Chuck Lane
National Exposure Research Laboratory, Ecological Exposure Research Division, Cincinnati

Rick McKinney
National Health and Environmental Effects Research Laboratory, Atlantic Ecology Region, Narragansett

Scott Leibowitz and Jim Wigington
National Health and Environmental Effects Research Laboratory, Western Ecology Division, Corvallis

Roger Burke
National Exposure Research Laboratory, Ecological Research Division, Athens

Allison Roy
National Risk Management Research Laboratory, Sustainable Technology Division, Cincinnati

Chris Nietch
National Risk Management Research Laboratory, Water Supply and Water Resources Division, Cincinnati

12:00 noon − 1:15 p.m.	**Lunch** (*on your own)*
1:15 p.m. − 3:30 p.m.	**Breakout Groups: Key Science Needs Identified From Previous Day** (*Shenandoah, Appalachian #402, and Chesapeake #103 Rooms)* *Facilitated Discussions: How Well Does the ORD Research Framework Reflect Regional/State Program Needs?* *(We will provide a specific "charge" to the groups. Each group will be co-chaired by an ORD and Regional representative.)*
3:30 p.m. − 4:30 p.m.	**Group Reports — How Well Will the Framework Address Priority Needs and Recommendations To Amend the Framework**
4:30 p.m.	**Adjourn**

Poster Titles

The Role of Headwater Streams in Water Quality Assessment and Management
K.M. Fritz, B.R. Johnson, R.A. Burke, B.H. Hill, C.T. Nietch, P.J. Wigington, and RJ.F. Bruins

Spatial and Functional Characterization of Isolated Wetlands
C.R. Lane, R.A. McKinney, R.A. Lopez, and R.J.F. Bruins

Extent of Headwater Perennial and Intermittent Streams
H.M. Childers, M.E. Passmore, and L.J. Reynolds

Revisiting the Analysis of the Condition of Streams in the Primary Region of Mountaintop Mining/Valley Fill Coal Mining
G. Pond and M.E. Passmore

A Survey of the Condition of Streams in the Primary Region of Mountaintop Mining/Valley Fill Coal Mining
J.H. Green, M.E. Passmore, and H.M. Childers

Ionic Stress in Appalachian Headwater Steams. Are Total Dissolved Solids Toxic?
G.J. Pond, M.E. Passmore, and T. Norberg-King

Coho Salmon Dependence on Intermittent Streams
P.J. Wiginton, J.L. Ebersole, and M.D. Colvin

Factors Controlling the Hydrologic Permanence of Headwater Streams
K. Fritz, B. Johnson, and D. Walters

Biodivesity Values of Isolated Wetlands of the Mid-Atlantic Highlands
D. Grossman

Overview of Recent, Current, and Proposed Projects of the West Virginia Water Science Center
T. Messinger and H. Bevans

Nutrient Concentrations in Flowing Waters of the South Fork Broad River, Georgia Watershed
R.A. Burke, J. Molinero, D.L. Spidle, and L. Prieto

Effects of Mountaintop Mining/Valley Fill (MTM/VF) on Functional Indicators in Appalachian Headwater Streams
R.A. Burke, S. Fulton, K. Fritz, B. Johnson, and C. Barton

Biodiversity Values of Geographically Isolated Wetland in the United States
K. Goodin and P. Comer

Stream Salamanders as Indicators of Stream Quality in Maryland
M. Southerland, D. Baxter, G. Mercurio, J. Vølstad, R. Jung, and I. Chellman

Collaborative Hydrological Research in the Clarksburg, Maryland Special Protection Area
S.T. Jarnagin and D.B. Jennings

Regional Science Workshop on Headwaters and Associated Wetlands in the Mid-Atlantic Highlands Region

EPA Region 3
4th Floor Conference Center, Shenandoah Room
1650 Arch Street
Philadelphia, PA 19103

June 20–21, 2006

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Regional Science Workshop on Headwaters and Associated Wetlands in the Mid-Atlantic Highlands Region

EPA Region 3
4th Floor Conference Center, Shenandoah Room
1650 Arch Street
Philadelphia, PA 19103

June 20-21, 2006

Meeting Evaluation Summary

An evaluation of the workshop was conducted to elicit information from attendees regarding the organization and logistics for the workshop, the information presented, and potential improvements in future workshops. Five questions were developed for the evaluation form. Of the five questions, four were statements that attendees were asked to rate on a scale of 1 (lowest) to 5 (highest). Attendees also could provide additional comments regarding each of these questions. One open-ended question allowed attendees the opportunity to provide any other comments or suggestions for future workshops. A summary of the evaluation findings is provided below.

Summary of Findings

1. Of the 61 meeting participants, 19 completed the evaluation questionnaire, for an overall response rate of 31 percent.

2. The attendees indicated that the meeting was informative. Of the 19 respondents, 11 provided a rating of 5 (58.0%), 6 provided a rating of 4 (32.0%), and 2 provided a rating of 3 (10.0%) for an average rating of 4.5.

3. The attendees indicated that the format of the meeting was appropriate. Of the 19 respondents, 11 provided a rating of 5 (58.0%), 6 provided a rating of 4 (32.0%), and 2 provided a rating of 3 (10.0%) for an average rating of 4.5.

4. The attendees indicated that the general discussions were useful. Of the 19 respondents, 10 provided a rating of 5 (53.0%), 8 provided a rating of 4 (42.0%), and 1 provided a rating of 3 (5.0%) for an average rating of 4.5.

5. The attendees indicated that the meeting facility was appropriate. Of the 19 respondents, 12 provided a rating of 5 (63.0%) and 7 provided a rating of 4 (37.0%) for an average rating of 4.6.

6. Of the 19 respondents, a total of 13 (68%) provided recommendations for improving future meetings.

Question 1: The meeting was informative.

Rating: Number of Responses: 19
Highest Rating: 5
Lowest Rating: 3
Average Rating: 4.5

Question 2: The format of the meeting was appropriate.

Rating: Number of Responses: 19
Highest Rating: 5
Lowest Rating: 3
Average Rating: 4.5

Question 3: The general discussions were useful.

Rating: Number of Responses: 19
Highest Rating: 5
Lowest Rating: 3
Average Rating: 4.5

Question 4: The meeting facility was appropriate.

Rating: Number of Responses: 19
Highest Rating: 5
Lowest Rating: 4
Average Rating: 4.6

Recommendations for Improving Future Meetings

- More diverse audience (e.g., other agencies, universities, and divisions within EPA such as enforcement).
- Expand the dialog.
- Appropriate flexibility in revising the agenda on the fly.
- Improve your management of the few who talk too much.
- As usual, not enough time in discussion (just whining. No action needed).
- Invite (and provide money if needed) more Corps of Engineers folks to these meetings. There are at least three state folks (including me) but only one Corps person (as far as I can tell). Because the Corps and states implement this work, they must be aware of the science (developing and completed).
- The use of an actual master of ceremonies (like someone from the Environmental Law Institute) to keep us on topic and schedule could be useful (but an expense).
- Great to have states/regions/ORD. Very important.

- Excellent opportunity for sharing of information.
- Panel discussions were a wonderful way to bring the audience/participants information and to open discussion of issues and concerns.
- Well organized and great diversity of researchers and others represented.
- Better organization for poster session: getting more people to come and socialize.
- Have poster session immediately after talks and provide optional alcoholic beverage or announce as BYOB.
- Bring other disciplines to the discussion: planners, lawyers, economists.
- Beer at the poster session or at least let us know it is BYOB ahead of time.
- Needed environmental lawyer(s) to attend.
- Better focus on common outcomes that are mutually needed to achieve goals (IW Headquarters).
- Air conditioner noise, microphone issues.
- I thought that the individual and panel presentations were very informative along with the question and answer discussions. More time could have been allocated to the panel members on some of the presentations (more than the 5 minutes).
- I did not feel that the exercise to develop a message outline was all that useful and could have been better spent discussing the science.
- A bit more information/focus on wetlands would have balanced the meeting. It was very heavy on stream discussions (that's okay, but I was expecting a balance).
- A professional facilitator would have helped the open discussions.
- Inclusion of more non-EPA folks in the meeting to diversify opinions.